

Appendix G: pre-installation, default settings and choice architecture for mobile browsers

Introduction

1. As discussed in Chapter 5, Apple and Google influence user behaviour in terms of the mobile browser they use through choice architecture,¹ including in particular pre-installation and default settings (default in this regard means that the browser automatically opens and renders a webpage upon a user clicking a link to a website, for example, in an email, without the user needing to select the browser manually).
2. In this appendix, we provide additional details on the following topics that are discussed in Chapter 5, namely:
 - the current agreements for pre-installation and default settings on mobile devices;
 - the impact of pre-installation and default settings on user behaviour; and
 - the impact of the choice architecture of the different routes available to users for switching their default browsers.

Current agreements

iOS devices

3. Since the launch of the iPhone in 2007 Safari is the only browser pre-installed on iOS devices. Apple submitted that the pre-installation and integration of Safari on its devices gives users a ‘premium out-of-the-box experience’.
4. Safari is also set as the default browser on iOS devices. Since September 2020 users can change the default browser in their device’s settings. To change the default a user needs to first download the browser they wish to set as the default as there are no other browsers pre-installed on iOS devices.
5. Apple has agreements with search engine providers, under which it receives a share of search advertising revenue where that search engine is set as the

¹ Choice architecture describes the contexts in which users make decisions and how choices are presented to them. In online or digital settings, choice architecture refers to the environment in which users make choices, including the presentation and placement of choices, and the design of user interfaces. Examples of choice architecture are the ordering of options available to users, the user interface design for changing default settings, presentation of search results etc. See Thaler, R. H., Sunstein, C. R., & Balz, J. P. (2013). [Choice Architecture](#). In E. Shafir (Ed.), *The Behavioral Foundations of Public Policy* (pp. 428-439). Princeton University Press for details on choice architecture.

default on Safari.² Under Apple's agreement with Google, Google Search is set as the primary default on iOS devices. Bing and DuckDuckGo hold agreements regarding their inclusion as a secondary option that users can select from a menu in the device settings.³

Android devices

6. Google has a network of agreements with device manufacturers to pre-install its apps – including Chrome and Google Search – and set them as the default.⁴
7. In 2018, the European Commission found in its Google Android investigation that Google had engaged in practices that aimed at cementing its dominant position in general internet search.⁵ Prior to the Google Android case, Google licenced Chrome to device manufacturers free of charge as part of a suite of 11 applications and services named Google Mobile Services (GMS). It was not possible for device manufacturers to pre-install only a subset of apps. In particular, that meant that if a device manufacturer wanted to pre-install Google Play, Chrome (and Google Search) also had to be pre-installed.
8. As a result of the Google Android case, Google reduced the number of applications in GMS by removing Chrome and Google Search. Device manufacturers that license GMS can now license Chrome (and Google Search) separately at no cost with no placement or default requirements.^{6,7} However, Google also adopted a paid licensing structure for GMS, which previously had been free.
9. Licensing of GMS is governed by the European Mobile Application Distribution Agreement (EMADA). Google generates revenue from

² For further detail see, CMA (2020), Online Platforms and Digital Advertising Market Study, Final Report, [Appendix H](#), paragraph 28.

³ Browsers and devices generally allow consumers to change the initial default search engine through a settings menu. Within these settings, consumers may be presented with several alternative options. Unless otherwise stated, we use the term 'default' to refer to the initial or primary default on a browser or device and the term 'secondary option' to describe the set of alternative search engines that are offered to consumers within the settings menu of a device or browser.

⁴ See Appendix E for detail on the agreements Google enters with device manufacturers.

⁵ Case AT.40099 – Google Android, [European Commission, Decisions of 18 July 2018 relating to proceedings under Article 102 of the Treaty of the Functioning of the European Union and Article 54 of the EEA Agreement, C\(2018\)4761 final](#). The European Commission found that Google had been (i) tying Google Search with the Play Store; (ii) tying Chrome, with the Play Store and Google Search; (iii) making the licensing of the Play Store and Google Search conditional on agreements that contain anti-fragmentation obligations; and (iv) granting revenue share payments to device manufacturers and mobile network operators on condition that they pre-install no competing general search service on any device within an agreed portfolio.

⁶ As a result of the Google Android case, Google also no longer sets Google Search as the default search engine in Chrome.

⁷ We note that it is still a prerequisite for device manufacturers to have licensed GMS to enter into the separate Chrome and Google Search agreements. However, device manufacturers now have the option to license GMS without Chrome and/or Google Search.

manufacturers entering the EMADA, which pay Google a license fee per activated device, depending on device type, certain device characteristics and activation location [§].⁸

10. Device manufacturers have the option to compensate for the cost of the EMADA by entering into a Placement Agreement (PA) and/or a Revenue Share Agreement (RSA) with Google.
 - Under the PAs, device manufacturers receive a per device activation payment when they pre-install Chrome and satisfy specific placement obligations. The PA is non-exclusive and does not prevent other browsers being displayed prominently.
 - Under its RSAs, Google pays a proportion of advertising revenue generated from specific Google Search and Google Assistant access points to device manufacturers in return for placement and promotion.⁹ RSAs typically apply to all devices in a territory, though variations are possible. The placement obligations include obligations for Chrome and require Google Search be set as default in any pre-installed manufacturer browser.¹⁰
11. Google provided aggregate figures for payments it made as part of its PAs and RSAs to the top five third-party Android manufacturers shipping devices into the UK, according to Statcounter. Google paid these manufacturers approximately \$[1-1.5] billion in Search and Search/Chrome Activation Payments under PAs covering the UK, EEA and Turkey in 2020. Most of that figure was paid to Samsung, [§]. Google paid these top five third-party Android manufacturers approximately \$[1.5-2] billion in ad and Play transactions revenue from their devices under worldwide Revenue Share Agreements in 2020. Most of that figure was paid to Samsung, [§].

Impact of pre-installation and default settings on consumer behaviour

12. We consider below evidence regarding the impact that pre-installation and default settings have on consumer behaviour with respect to browser choice.

⁸ For further detail on the EMADA, see Appendix E.

⁹ Google Assistant is Google's voice assistant. For further detail, see <https://assistant.google.com/>

¹⁰ Google told us that third-party browsers (as opposed to manufacturer browsers) can have non-Google search services set as default instead, provided that they are not placed on the default home screen (unless in a folder) or the minus one screen. Google also told us that after the European Commission's Google Android decision, the default search service in Chrome is set according to the Android choice screen mechanism that applies in the UK and EEA.

Stakeholder submissions

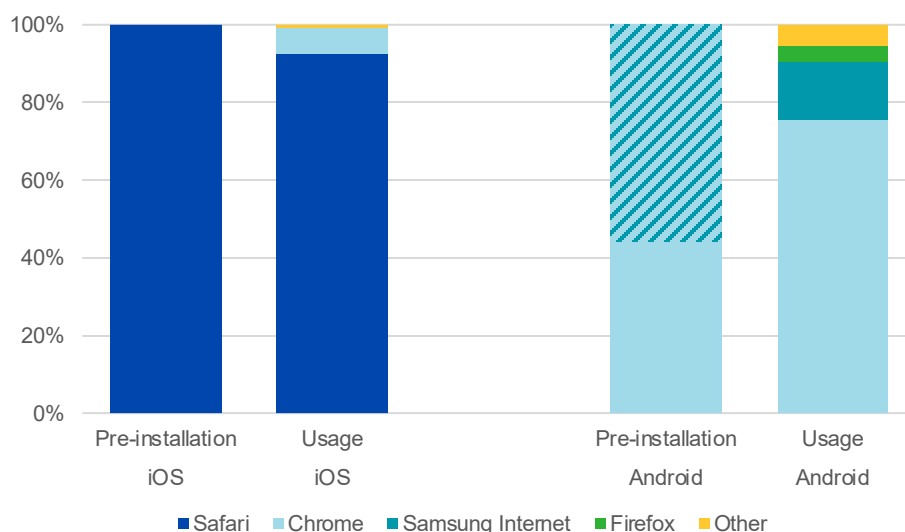
13. Apple and Google both submitted that pre-installed and pre-set default browser apps on mobile devices can be beneficial as they provide users with a seamless and superior out-of-the-box experience.
14. However, we heard views from a number of parties which indicated that pre-installation and default settings also significantly influence which browser users use. For example:
 - Microsoft submitted that pre-installation and default settings drive mobile browsers' usage shares, while Samsung submitted that pre-installation and default settings may provide an advantage in competition for users because of user inertia and their willingness to use the option provided to them out-of-the box.
 - [One browser vendor] submitted that users are more likely to find and use a browser if it is available on the home screen (which we understand is where the main pre-installed browser is typically located).
 - Moonchild Productions submitted that users would only switch if there were significant issues with the pre-installed or default browser.
15. Browser vendors further highlighted the importance of ease of switching. For example:
 - Mozilla submitted that design choices with respect to user experience and the user interface (UI) make it difficult or impossible to delete pre-installed software or to pin alternative software and make it the default.
 - Yandex submitted that the effects of pre-installation and default settings could depend on how time consuming it is to install or set another browser as the default.
 - Brave submitted that a lack of awareness of existing defaults and/or an inability to set an alternative third-party browser as a default browser restricts user choice. Brave further submitted that competition may be encouraged if users were to receive a notice advising that they can change their default browser.

Correlation between pre-installed browsers and shares of supply

16. There is a strong correlation between the browsers that are pre-installed and/or set as defaults on mobile devices and their usage (as measured by their share of supply). In particular, as Figure G.1 shows:

- Safari is the pre-installed default browser on all iOS mobile devices and its share of supply in iOS mobile browsers amounts to 93%;
- Chrome is pre-installed on most (and set as default on around 44% of) Android mobile devices and has a share of supply in Android mobile browsers of 75%;¹¹ and
- Samsung Internet is pre-installed (alongside Chrome) and set as default on 56% of Android mobile devices and has a share of supply in Android mobile browsers of 15%.

Figure G.1: Pre-installation and share of supply of browsers on mobile devices in the UK, 2020



Source: CMA analysis using App Annie data (provided by a browser vendor) and Statcounter GlobalStats ([Mobile operating system share of supply UK 2020](#), [Mobile vendor share of supply United Kingdom UK 2020](#)).
 Note: Mobile devices refers to both smartphones and tablets. For this analysis, given that Chrome is pre-installed on most Android devices, we assumed, for simplicity, that it is pre-installed on all Android mobile devices. Samsung Internet is currently pre-installed on all Samsung mobile devices. Share of pre-installed Samsung Internet is calculated based on Samsung's share as a mobile device vendor. Samsung pre-installs both Samsung Internet and Chrome and sets Samsung Internet as the default. Share of supply are based on page views.

17. An even starker pattern can be observed when comparing Samsung Internet browser usage on Samsung devices (where it is the pre-installed browser alongside Chrome and set as the default) vs. non-Samsung devices (where it is not). In particular, Samsung submitted that while it cannot state with exact accuracy, [a very low proportion] of Samsung Internet's usage is generated from non-Samsung devices, implying that [most of] the usage of its browser is from devices where it is the pre-installed default browser.
18. Moreover, the position of Edge on desktop compared to mobile devices indicates that default settings impact user choice. In 2020, Edge had a 5%

¹¹ We understand that Chrome is the default browser on most of the non-Samsung Android mobile devices.

share of desktop (where it is the pre-installed default browser) but no material share of mobile (where it is not).¹²

Data on actual user switching

19. We have asked Apple and Google for data on the proportion of users that have downloaded additional browsers or changed their default browser on iOS and Android devices, respectively.
20. With respect to installing additional browsers:
 - data received from Apple suggests that, since 2015, [20-30%] of users in the UK installed additional browsers or search-enabled apps on their iPhone and iPad devices, although Apple submitted that it anticipates this number to likely be even higher, as the percentage is based on downloads from only twenty popular browser and search apps available on the UK App Store;¹³ and
 - Google submitted that it does not hold data on the proportion of users that have installed an additional browser on their Android mobile device.
21. With respect to changing the default browser:
 - Apple submitted that it does not maintain data on the proportion of current iOS users that have changed their default browser on their current iOS device; and
 - Google submitted that it does not hold data on the proportion of users that changed their default browser. Google submitted data on the proportion of Chrome user sessions on Android mobile devices where the user's default browser is different from the pre-installed default. There are certain limitations associated with this data which we will need to understand further before drawing conclusions on what this data indicates with respect to the impact of default settings.

¹² In 2020, Edge Legacy had a 6% share of supply on desktop devices and 0.2% share of supply on mobile devices. Microsoft ended its support for Edge Legacy on 9 March 2021. Statcounter, [Desktop browser share of supply UK 2020](#), [Mobile browser share of supply UK 2020](#). Microsoft, [New Microsoft Edge to replace Microsoft Edge Legacy with April's Windows 10 Update Tuesday release](#)

¹³ Apple submitted that it anticipates this number to likely be even higher, as the percentage is based on downloads from only twenty popular browser and search apps available on the UK App Store.

User research

22. As part of our investigation, we considered consumer surveys as well as evidence submitted to us by stakeholders on user behaviour regarding browser usage in the context of pre-installation and default settings.

Consumer surveys received

23. While we asked all main browser vendors to submit any user research they hold on this topic, we only received a relatively small number of consumer surveys. The key ones we received are:
- a consumer survey commissioned by the Australian Competition and Consumer Commission in May 2021 (the ACCC 2021 consumer survey);¹⁴
 - an online user survey conducted by [party] in November 2020 (the 2020 user survey); and
 - a brand tracking online survey conducted by [party] in November 2020 (the 2020 brand tracking survey).
24. The ACCC 2021 consumer survey is an online consumer survey comprising of 2,647 Australian adult consumers.
25. The 2020 user survey is an online survey which included 1,001 UK adult (18+) iPhone users (although it also included respondents from the US and Japan), while the 2020 brand tracking survey is an online survey conducted in the US with 1,082 respondents (including a boost of n=80 of 25-34 year olds).
26. We have certain concerns around the representativeness of the received survey evidence, and the results of the surveys should be seen in this context:
- Both the 2020 user survey and the 2020 brand tracking survey focused on iOS users and their response to Apple providing iOS users with the option to switch their default browser away from Safari (following the introduction of iOS 14 in September 2020).¹⁵
 - The 2020 user survey sample upweighted younger users (18-34 year olds formed 57% of the sample) and was limited to users with knowledge of

¹⁴ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#).

¹⁵ [How to change your iPhone's default browser \(mashable.com\)](#).

mobile internet browsers, potentially biasing the sample towards more digitally confident users and those who were more likely to switch.

- The 2020 brand tracking survey had a possible sample bias towards users more confident with digital technology (as respondents were likely members of an online panel and hence likely to be more confident with digital technology and more comfortable with switching default browser settings).
- Both the ACCC 2021 consumer survey and the 2020 brand tracking survey were based on a non-UK panel.

Evidence on consumers adhering to pre-installed and/or default browsers

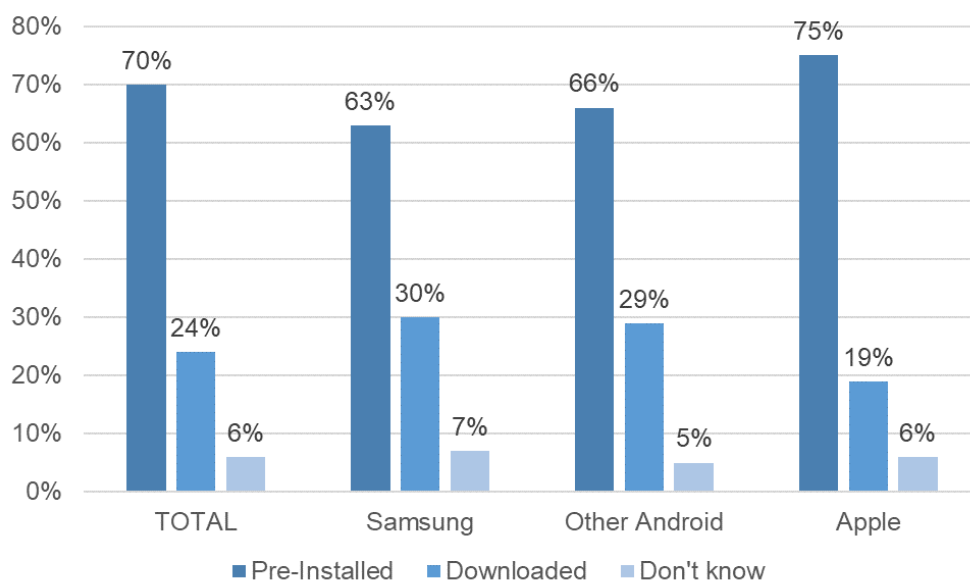
27. The ACCC 2021 consumer survey found that 55% of users only used pre-installed browser(s) on their current smartphone.¹⁶ It also found that the main browser used on smartphones had been pre-installed in 70% of cases, as shown in Figure G.2 below.¹⁷
28. Figure G.2 further shows that iPhone users reported being more likely to choose a pre-installed browser (75%) compared to 63% for Samsung users and 66% for other Android device users. In contrast (and not shown in Figure G.2), for computers, the main browser used was pre-installed in only 44% of cases.¹⁸

¹⁶ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 12.

¹⁷ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 46.

¹⁸ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 46.

Figure G.2: Participant response to survey question about how the primary browser on their phone was installed by device type



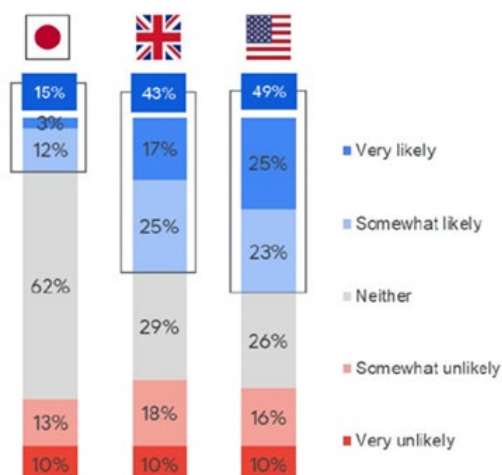
Source: Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 46 (redrawn).

29. The ACCC 2021 consumer survey further found that only around one in three (36%) of respondents said that they had ever changed the default browser on their smartphone.¹⁹

30. The 2020 user survey, which included 1,001 UK adult (18+) iPhone users, found that 43% of UK iPhone users were likely to update their settings to a different default browser, whilst 28% of users were unlikely to update their default browser settings in this way (with 18% stating that they were 'somewhat unlikely' and 10% stating they were 'very unlikely' to do so). A further 29% stated they were neither likely nor unlikely to do so (see Figure G.3). Younger users (between 18-34 years) were more likely to update their default browser. As noted above, these survey results were collected in the context of iOS users' response to Apple providing iOS users with the option to switch their default browser away from Safari (following the introduction of iOS 14 in September 2020).

¹⁹ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 54.

Figure G.3: Participant response to survey question 'How likely are you to update your settings to a different default browser?'



Source: 2020 user survey.

Note: Sample included participants from Japan (n=601), UK (n=1001) and US (n=1020).

31. The 2020 brand tracking survey, which included 1,082 US iPhone users, found that, following the release of iOS 14, around four in ten iPhone users reported having updated their default browser settings, with less tech savvy users lagging behind. This implies that around 60% of users did not update their default browser setting, a percentage which may be even higher for users who are less technically confident.
32. This evidence on consumers sticking to pre-installed and/or default browsers is consistent with the final report of the CMA's market study into online platforms and digital advertising, which noted that mobile defaults can be more powerful than desktop defaults, in part because consumers are less likely to change default settings on a smaller screen.²⁰

Reasons for consumers sticking to pre-installed and default browsers




33. As we set out in further detail below, there appear to be a number of reasons why consumers do not switch to a different browser: while the survey evidence indicates that users have a preference for maintaining the status quo with respect to browser choice (ie despite being able to switch, they are biased towards continuing to use the browser that is pre-installed and/or set as default), it also shows that some users do not know how to change their default browser. Additionally, however, the survey evidence also indicates that users stick with the pre-installed and/or default browser because it is their preferred browser.

²⁰ CMA (2020), Online Platforms and Digital Advertising Market Study, Final Report, [Appendix V](#), p V7.

Status quo bias²¹

34. The 2020 user survey, which included 1,001 UK adult (18+) iPhone users, found that, among iPhone users, keeping Safari as the default browser is driven by a preference for maintaining the status quo. In particular, and as shown in Figure G.4, among users who were asked why they are planning to keep Safari as their default browser, 38% cited familiarity with Safari as the reason for the choice while 34% said it was because it was already installed on their device. For completeness, we note that the overall most popular reason cited by respondents was ‘works best with my iPhone’. As noted above, these survey results were collected in the context of iOS users’ response to Apple providing iOS users with the option to switch their default browser away from Safari (following the introduction of iOS 14 in September 2020).
35. As also noted above, we have concerns that the survey sample upweighted younger users, potentially biasing the sample towards more digitally savvy users. In a more representative sample, which would proportionately account for the preferences of older and perhaps less tech savvy users, the proportion of users choosing Safari due to status quo factors (familiarity and pre-installed on device) could potentially be even higher.

Figure G.4: Participant response to survey question ‘Why are you planning to keep Safari as your default browser? (Select all that apply)’

			
Familiarity	44%	Works best on my iPhone 39%	Familiarity 39%
Already installed on device	23%	Familiarity 38%	Already installed on device 39%
Works best on my iPhone	23%	Already installed on device 34%	Works best on my iPhone 36%
No specific reason	21%	Easier to navigate 27%	Faster 24%

Source: 2020 user survey

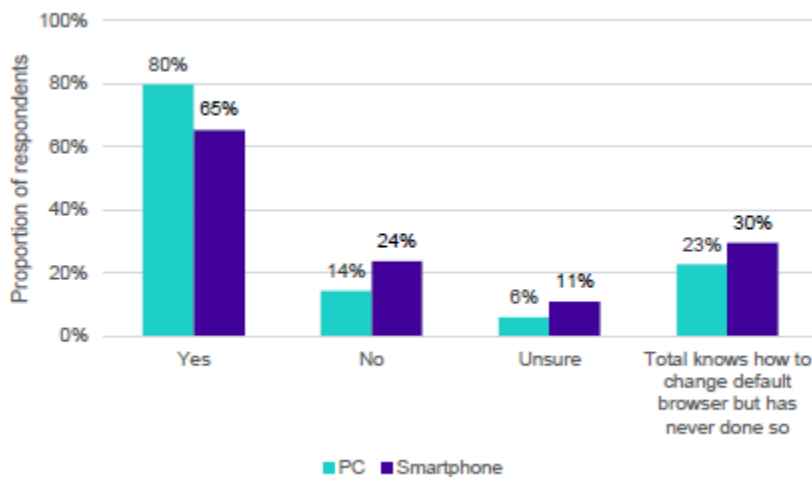
Consumers not knowing how to switch

36. The ACCC 2021 consumer survey found that 35% of users did not know how to change the default browser or were unsure about it. In particular, when users were asked explicitly whether they know how to change the default browser, about one in four users (24%) said that they did not know how to change the default browser on their smartphone, while about one in ten (11%)

²¹ Status quo bias refers to an individual’s tendency to do nothing or to maintain their current or previous decision. See Samuelson, W., & Zeckhauser, R. (1988). [Status quo bias in decision making](#). *Journal of Risk and Uncertainty*, 1, 7-59.

reported being unsure, as illustrated in Figure G.5.²² Moreover, older consumers were more likely to report that they did not know how to change the default browser on their smartphone (42% among 65-79 year olds and 55% among those aged over 80 years) or on their computer (31% among 65-79 year olds and 46% among those aged over 80 years).

Figure G.5: Participant response to survey question about whether they know how to change the default browser on their device



Source: Australian Competition and Consumer Commission (2021), Digital platform services inquiry, [Interim report No. 3 – Search defaults and choice screens](#), p 47.

37. The 2020 user survey, which included 1,001 UK adult (18+) iPhone users, found that, following the release of iOS 14 and Apple’s decision to allow users the option to switch their default browser from Safari, only 46% of UK respondents reported being aware of the default browser update. Further, as discussed in the final report of the CMA’s market study into online platforms and digital advertising, users can be deterred from changing defaults due to limited technical proficiency and the complexity involved in changing default settings.²³

²² Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 53.

²³ CMA (2020), Online Platforms and Digital Advertising Market Study, Final Report, [Appendix H](#), p H29.

Pre-installed and/or default browsers coinciding with preferred browser

38. The ACCC 2021 consumer survey found that 42% of users said the main reason for using their primary (or only) browser was that it was their preferred product.²⁴ ²⁵ This proportion is even higher for Chrome, at 57%.²⁶

Why pre-installation and defaults impact user behaviour – evidence from the behavioural literature

39. Along with reasons that users can self-identify when asked in surveys, the behavioural literature also identifies underlying factors consumers may be less aware of influencing their choices.
40. Defaults have had a powerful impact in influencing decision-making across a wide range of behaviours including enrolment into pension savings,²⁷ organ donation²⁸ and selecting features in smartphone apps.²⁹ A meta-analysis of default studies observed a strong impact of defaults on behaviour with the majority of the studies finding a positive effect of default choices on decision-making.³⁰ These effects are underpinned by *status quo bias*, ie an individual's tendency to do nothing or to maintain their current or previous decision.³¹ Thus, when it comes to the choice of browsers, users are likely to display a propensity for sticking with the default browser.
41. Other relevant behavioural mechanisms underpinning the impact of defaults on user choice include:³²
- **Inertia:** due to user inertia and a tendency to procrastinate, users may prefer maintaining the status quo by retaining the default browser in order to reduce the cognitive effort of having to explore other browsers and

²⁴ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 40.

²⁵ Further, we note that 52% of users said that the reason behind their choice of primary browser was that it was already installed on their smartphone and they had no reason to use another browser. The survey report notes that it is unclear how this should be interpreted. On the one hand, this may indicate that users have not felt the need to actively choose their browser. On the other hand, it may imply a genuine choice from user to stick with the installed browser. See Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 11.

²⁶ Roy Morgan (2021), [Consumer Views and Use of Web Browsers and Search Engines](#), p 42.

²⁷ Madrian, B. C., & Shea, D. F. (2001). [The Power of Suggestion: Inertia in 401\(k\) Participation and Savings Behavior](#). *The Quarterly Journal of Economics*, 116(4), 1149–1187.

²⁸ Johnson, E. J., & Goldstein, D. (2003). [Do Defaults Save Lives?](#) *Science*, 302(5649), 1338-1339.

²⁹ Joeckel, S., & Dogruel, L. (2020). [Default effects in app selection: German adolescents' tendency to adhere to privacy or social relatedness features in smartphone apps](#). *Mobile Media & Communication*, 8(1), 22-41.

³⁰ Jachimowicz, J., Duncan, S., Weber, E., & Johnson, E. (2019). [When and why defaults influence decisions: A meta-analysis of default effects](#). *Behavioural Public Policy*, 3(2), 159-186.

³¹ Samuelson, W., & Zeckhauser, R. (1988). [Status quo bias in decision making](#). *Journal of Risk and Uncertainty*, 1, 7-59.

³² Sunstein, C. R. (2013). [Deciding by Default](#). *University of Pennsylvania Law Review*, 162(1).

change the default browser settings. As noted above, Samsung mentioned this in its submission.

- **Implicit endorsement:** users may choose the default browser perceiving it to be an implicit endorsement or recommendation from the device manufacturer. The value of this recommended option can be especially high when users lack adequate information about alternative browser choices.
- **Reference point and loss aversion:** the default browser can serve as the users' reference point for decisions related to browsers. This can result in other browsers being evaluated against this reference. Since people dislike losses more than they like corresponding gains (*loss aversion*), users might be less inclined to shift away from the default browser and risk loss of browser features.

Routes for users to switch their browser

42. The ease of switching was highlighted by several browser vendors as playing an important role in how important pre-installation and default settings are.
43. Additionally, the user research discussed above indicates that, for some users, the reason for not switching away from their default browser is not knowing how to change their default browser.
44. In line with this, the final report of CMA's market study into online platforms and digital advertising notes that users can be dissuaded from changing defaults due to limited technical proficiency and the complexity involved in changing default settings (we note that these findings were made in the context of changing the default search engine rather than the default browser).³³
45. Below, we consider evidence regarding the routes available to users for switching their browsers.

User journey for changing the default browser

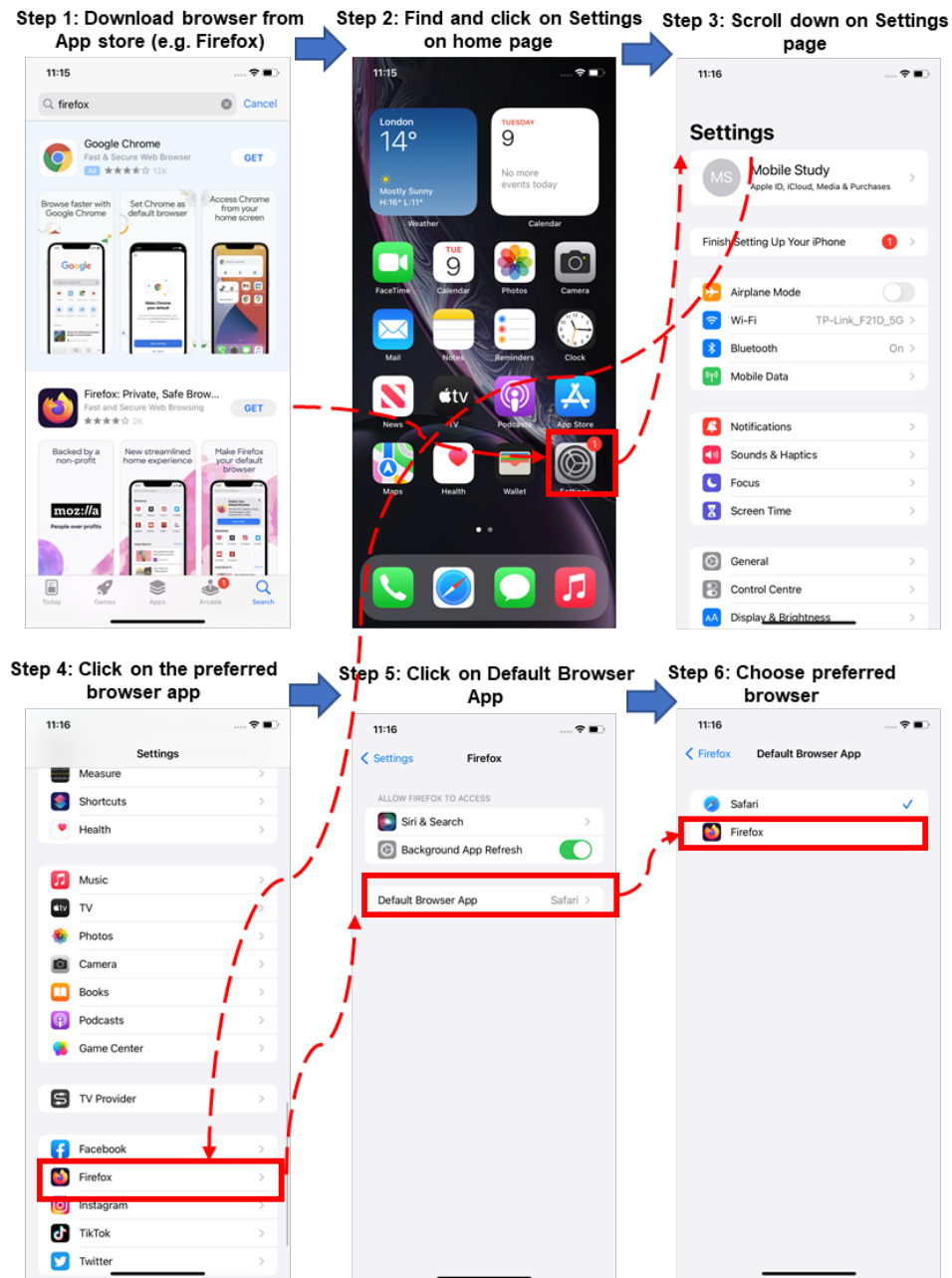
46. Several browser vendors have highlighted that it is difficult for users to switch browsers.
47. The user journey for changing default browser on both iOS and Android devices involves a number of potentially complex steps. Additionally, the

³³ CMA (2020), Online Platforms and Digital Advertising Market Study, Final Report, [Appendix H](#), p H29.

relevant option in device settings for switching defaults may not always have intuitive text labels, making it harder for users to search for them. Figure G.6 and Figure G.7 provide an illustration for changing default browser settings on an iPhone and an Android smartphone, respectively. Both user journeys involve downloading an additional browser from the App Store or Play Store and navigating to the relevant option on device settings to choose the preferred browser. Changing default browser settings can take around six steps on iPhones and around seven steps on Android devices, including scrolling (depending on device type/ manufacturer). With respect to iOS, Yandex submitted that it takes four additional steps to unpin Safari from the quick access panel and pin another browser.

48. The multiple steps and additional effort involved in this process could possibly dissuade users from changing default browser via device settings. Further, limited technical abilities can be another deterrent to users changing their default browser using device settings.

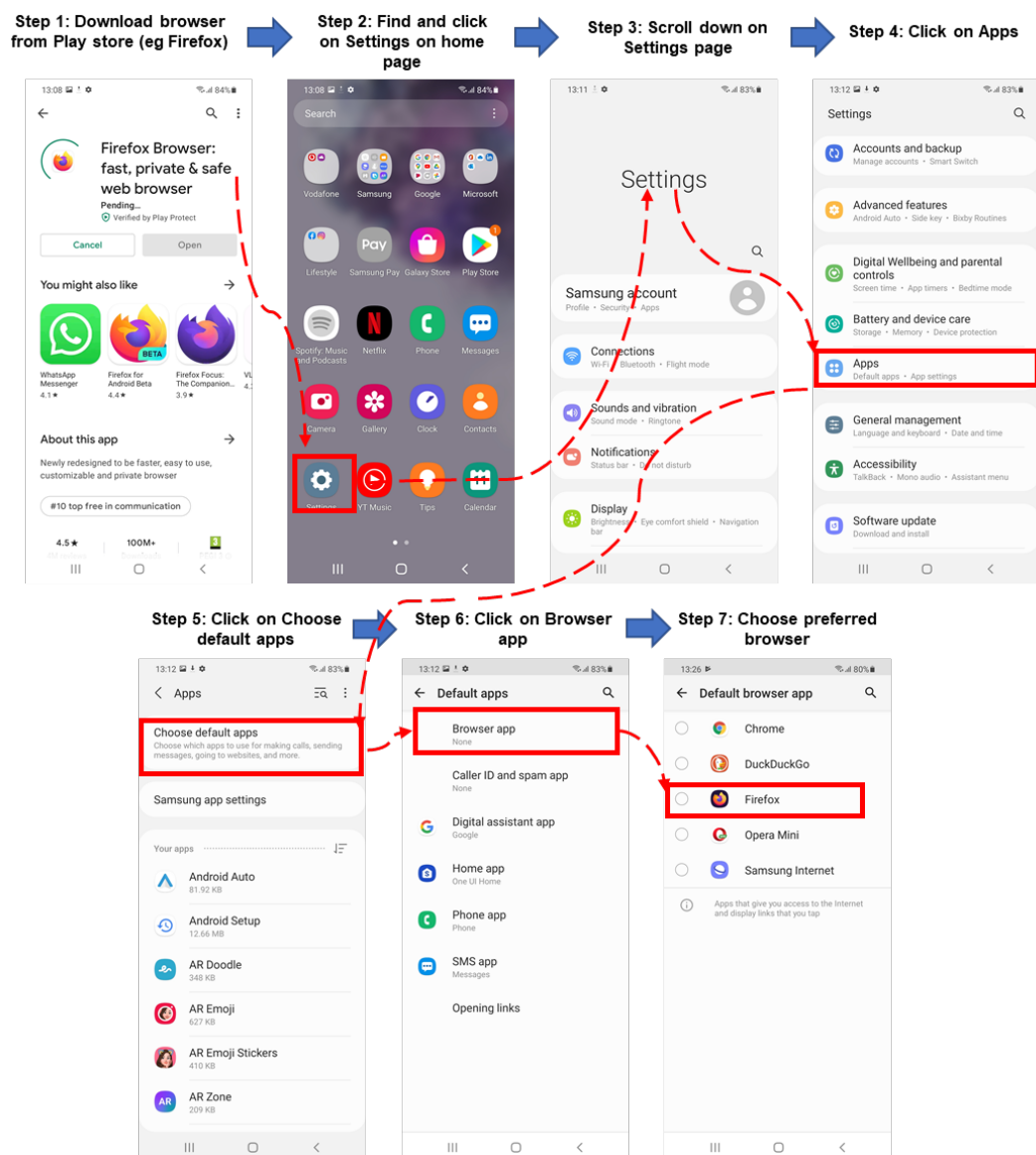
Figure G.6: User journey for changing default browser setting on iPhone



Source: CMA

Note: Screenshots taken on iPhone XR running iOS 15.1 in November 2021.

Figure G.7: User journey for changing default browser setting on Samsung Galaxy smartphone



Source: CMA

Note: Screenshots taken on Samsung Galaxy S20 running Android 11 in November 2021.

Choice screens for browsers and other prompts

49. At present, neither Apple nor Google have implemented choice screens that prompt users to make an empowered and effective choice on changing their browser default.
50. On iOS, we are not aware of any choice screens that Apple shows to ask users to download additional browsers or change their default browser away from Safari. On Android, Google told us that it implemented the following two choice screens which, in combination, could allow users to change their default browser:

- a Play choice screen for browsers that prompts new users to consider downloading additional browsers, but which does not allow users to change their default browser; and
 - a ‘disambiguation box’ that asks users to set a default browser.
51. In addition, on both iOS and Android, browser vendors and websites are, at least in certain circumstances, able to display prompts asking users if they want to switch their default browser.
52. We welcome Google’s proactive introduction of the choice screens. However, Google has removed the disambiguation box that asks users to set a default browser from the latest Android version (ie Android 12). Additionally, we have concerns that:
- the Play choice screen for browsers is only shown to a subset of users setting up a new device;
 - the choice architecture of the Play choice screens for browsers and the disambiguation box may be suboptimal and not sufficiently effective in empowering consumers to make choices about defaults; and
 - while browser vendors can display prompts asking the user if they want to switch their default browser, browser vendors are only able to show such prompts to a limited population of users (namely those that already have the respective browser installed on their device) and they also may not have access to the relevant API that allows them to launch shortcuts for changing the default browser settings.
53. Overall, and as discussed in further detail below, we do not consider that Google’s choice screens, as currently implemented, adequately empower users to make a choice about their browser default

Play choice screen for browsers (Android only)

54. Google told us that, in April 2019, it implemented a choice screen which is displayed the first time a user opens the Play Store on EMADA devices that preload the Google Search app and/or Chrome.^{34,35}

³⁴ For further details on EMADA, see Appendix E.

³⁵ Google told us that when introduced in April 2019, the Play choice screen displayed choice screens for both browsers and search apps, see [Presenting search app and browser options to Android users in Europe \(blog.google\)](#). However, as agreed with the European Commission, Google introduced a separate choice screen for search services in March 2020, to be displayed during the set-up process of newly activated EMADA devices that preload Google Search app. Hence, users of newly activated EMADA devices since March 2020 only see the choice screen for browsers when the Play Store is opened for the first time.

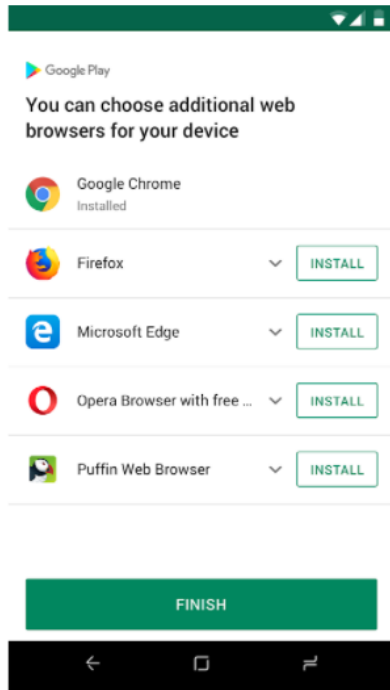
55. This choice screen gives users the option to install additional browser apps. However, the choice screen does not remove any of the browsers already installed on the device and installing an additional browser does not result in this browser automatically being set as the default (although, as discussed in the section on browser disambiguation boxes below, on Android devices running Android 11 or earlier versions, installing a new browser removes the default browser choice).
56. Google further told us that the introduction of choice screens was implemented in response to the European Commission's request.

Design and choice architecture of the Play choice screen for browsers

57. An illustration of the Play choice screen for browsers displayed on Android devices is presented in Figure G.8.
58. Google told us that the Play choice screen for browsers shows a list of up to five browser apps, including any which are already installed on the device. Other than the installed browser(s), the remaining browsers included in the list are the most popular browsers in the user's country, displayed in a random order. In the UK, the Play choice screen for browsers currently shows Chrome, Firefox, Edge, Opera and Brave.³⁶
59. Google told us that to be included in the choice screen list, the browser apps need to meet certain eligibility criteria, such as the app must be available on Statcounter and also the app should be available for download on the Play Store to UK/ EEA users and support an EEA language.

³⁶ Not all of these browsers will be shown in the choice screen if more than one browser is pre-installed on the device.

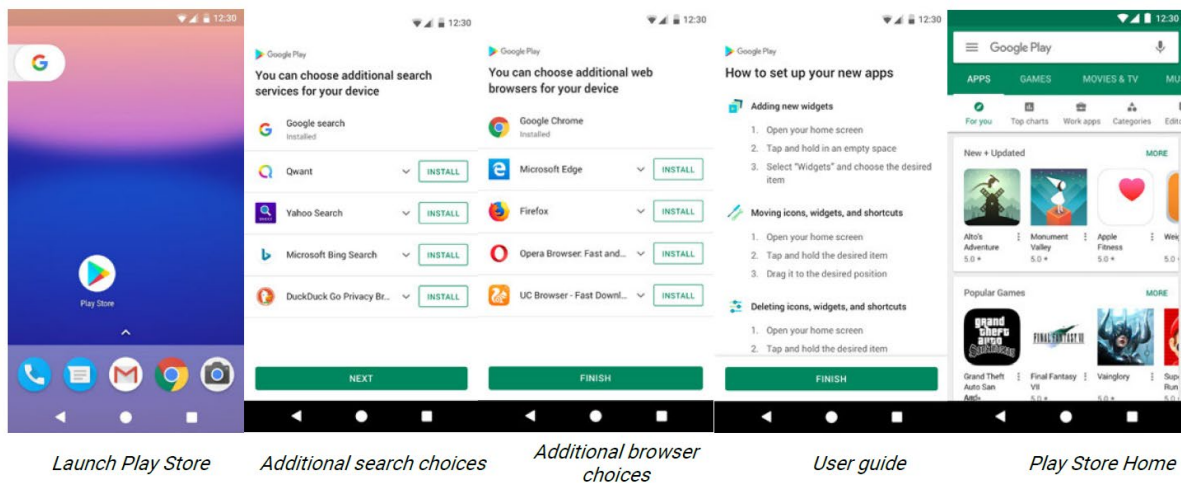
Figure G.8: An illustration of Play choice screen for browsers displayed on Android devices in the UK and EEA



Note: Apps displayed may vary by country, see [Presenting search app and browser options to Android users in Europe \(blog.google\)](#)

60. The choice flow shown to users when they launch Play store for the first time is illustrated in Figure G.9.

Figure G.9: Choice flow for the Play choice screen, introduced in April 2019



Source: Google

Note: We note that the choice flow shown is the choice flow when the Play choice screen was launched in 2019 and might have undergone changes since then. Google told us that the Play choice screen for search apps is not shown to users of newly activated EMADA devices since March 2020 upon launching Play store. Instead, they see a separate choice screen for search apps during device setup.

61. Google suggested that the principles used for designing effective user choice or UI can include proportionality, comprehension and context,³⁷ and that defaults are an inherent part of UI design. [§<]. Further, Google told us that, in this instance, atypically, the choice screens introduced in response to the European Commission's request were largely determined by discussions with the European Commission and others rather than through iterative testing.
62. The choice architecture of the current version of the Play choice screen for browsers has some features we have identified that could have implications for user behaviour:
 - Positioning of installed browsers:
 - The choice screen consists of a vertical list of browsers, where browsers already installed on the device are presented first, followed by other browsers ordered in a randomised fashion. Thus, the greater the number of browsers already installed on the device, the lower the number of available slots for additional browsers to be displayed to users. Therefore, where, for example, a device manufacturer has pre-installed a browser, there is less space to display alternative browsers and users will see fewer new browsers to download. With regard to displaying the browsers already installed on the device at the top of the Play choice screen for browsers, Google told us that it did not want to reduce the visibility of any browsers which have, for example, paid to be pre-installed on the device. In addition, Google told us that it would also be confusing to show installed and non-installed apps in a mixed list.
 - Pre-installed browsers are presented first at the top of the screen, and there is a possibility of users' attention therefore being drawn away from the list of additional browsers to download which is displayed below.³⁸
 - Choice placement, timing and frequency: the choice screen is shown only once per account when the user opens the Play Store for the first time:
 - The placement of the choice screen on first use of the Play Store may be suboptimal. DuckDuckGo told us that users are less likely to

³⁷ Proportionality means that the friction from implementing any choice should be proportionate to how relevant the choice is to maximising user welfare. Comprehension means choice options should be designed to maximise user comprehension by being 'well-structured, clearly described, and not overwhelming'. Context means that choices should be relevant to the user's current task and goals.

³⁸ This is owing to *primacy effects*, ie, user's tendency to pay more attention to information presented first. See Feenberg, D., Ganguli, I., Gaulé, P., & Gruber, J. (2017). [It's Good to Be First: Order Bias in Reading and Citing NBER Working Papers](#). *The Review of Economics and Statistics*, 99(1), 32-39 for details on primacy effects.

engage with choice screens during the device set up process as they are focused on getting through the process quickly. According to DuckDuckGo, users are more likely to explore alternative search services or browsers at a later stage, when they are using the device.

- As discussed in Chapter 7, we are seeking views on potential choice architecture principles for browser default choice screens which could empower consumers to make effective choices.

Effectiveness of the Play choice screen for browsers

63. The Play choice screen for browsers is only shown to a subset of users setting up a new device: Google submitted that the Play choice screen (for both browsers and search engines) is displayed once per Google account, the first time a user opens Google Play store. Google further explained that users who have encountered the choice screen on a previous device will not be shown the screen again if they change their device (while continuing to use the same Google account).³⁹
64. Based on Google's recent data in the UK, around [X] Android mobile devices were activated per month, while the Play choice screen for browsers was shown on around [X] Android mobile devices per month.⁴⁰ This implies that the Play choice screen for browsers was shown on approximately [a relatively large proportion] of recently activated Android mobile devices. In addition, Google said that, after its introduction in 2019, the Play choice screen for browsers was displayed to active users the first time a user opened Google Play after receiving an update.⁴¹
65. While Google told us that it does not record the number of devices on which the Play choice screen for browsers is used to download additional browsers, Google does record the number of browser downloads from the use of the Play choice screen for browsers (ie if a user chooses to download three browsers from the choice screen on a device, this would be counted as three downloads even though they came from a single device). Google submitted that in the UK from 1 September 2021 to 21 October 2021, the Play choice screen for browsers was shown on [X] Android mobile devices and there were [X] browser downloads from the use of the Play choice screen for

³⁹ Google told us that the reason behind showing the Play choice screen (for both browsers and search engines) just once per account, and not when the users say buy a new device, is because of backup and restore. When users transfer to a new device all installed browser apps on the old device will automatically get installed on the new one, limiting the need to remind users about installing additional browsers.

⁴⁰ Google submitted that in the UK from 1 September 2020 to 31 August 2021 [X] Android mobile devices were activated. It said that in the UK from 1 September 2021 to 21 October 2021 the Play choice screen for browsers was shown on [X] Android mobile devices.

⁴¹ Google, 2019, [Presenting search app and browser options to Android users in Europe \(blog.google\)](#)

browsers. This implies that in at most [a very low proportion] of cases in which the Play choice screen for browsers is shown, the user downloads an additional browser.

Disambiguation boxes (Android only)

66. As discussed above, the Play choice screen for browsers does not prompt users to choose a browser default. However, Google described a disambiguation box as the feature prompting users to choose a default browser.
67. In particular, on Android 11 and earlier versions, disambiguation boxes can appear in certain circumstances when users open links to websites or 'deep links' to native apps (ie links to content within specific apps). The box provides a list of the installed browsers (and in some instances certain non-browser apps) and prompts the user to choose one to open the link. The users have the option of making a one-off choice by selecting 'Just once' or they can select 'Always' to make their choice the default for opening similar links.
68. On Android 12, Google removed the disambiguation box from showing when the user tries to open a web link.^{42,43}

Android 11 and earlier versions

69. In our analysis, we have observed two types of disambiguation boxes which involve browsers. The first type (the browser disambiguation box) displays a list of all browser apps installed on the device and the second type shows a list of both browser and non-browser apps, installed on the device, the link can be opened with.
 - *Design of the browser disambiguation box*
70. On Android devices running Android 11 or earlier versions, installing a new browser removes the default browser choice. Thus, the next time a user clicks on a link to a website (which cannot also be opened by a native non-browser

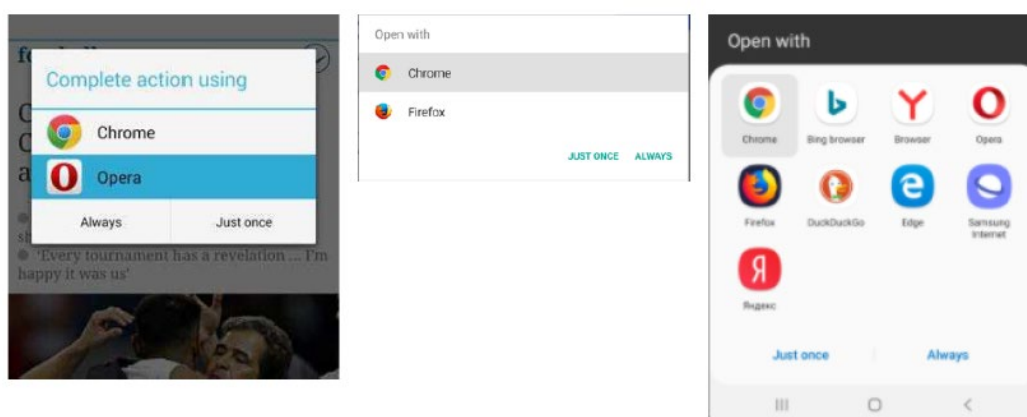
⁴² For verified web links (ie deep links specified by developers as being associated with their apps), the link will open directly in the specified app and no disambiguation box will surface for devices running Android 6.0 and above (Google told us that users can override this behaviour in Android Settings though).

⁴³ Google noted that disambiguation boxes are not limited to the context of web links and thus, in certain instances, do not include browser apps (or include a combination of browser and non-browser apps) and can continue to surface on devices running Android 12. For example, when an app declares an implicit intent, such as opening a PDF document without specifying a particular app to open it, if there are multiple apps installed on the device which can open the PDF, then a disambiguation box will be shown containing a choice of those apps (which can include browsers).

app) after having installed a new browser, the user gets shown a browser disambiguation box (or 'intent picker').⁴⁴

71. As noted above, the box provides two choice buttons at the bottom of the browser list, 'Just once' and 'Always'. Choosing the 'Always' option will stop the device from displaying the disambiguation box when the user tries to open a link after that, unless the user downloads an additional browser on their device (which will again remove the default browser choice).

Figure G.10: Iterations of the browser disambiguation box on Android devices



Source: Google

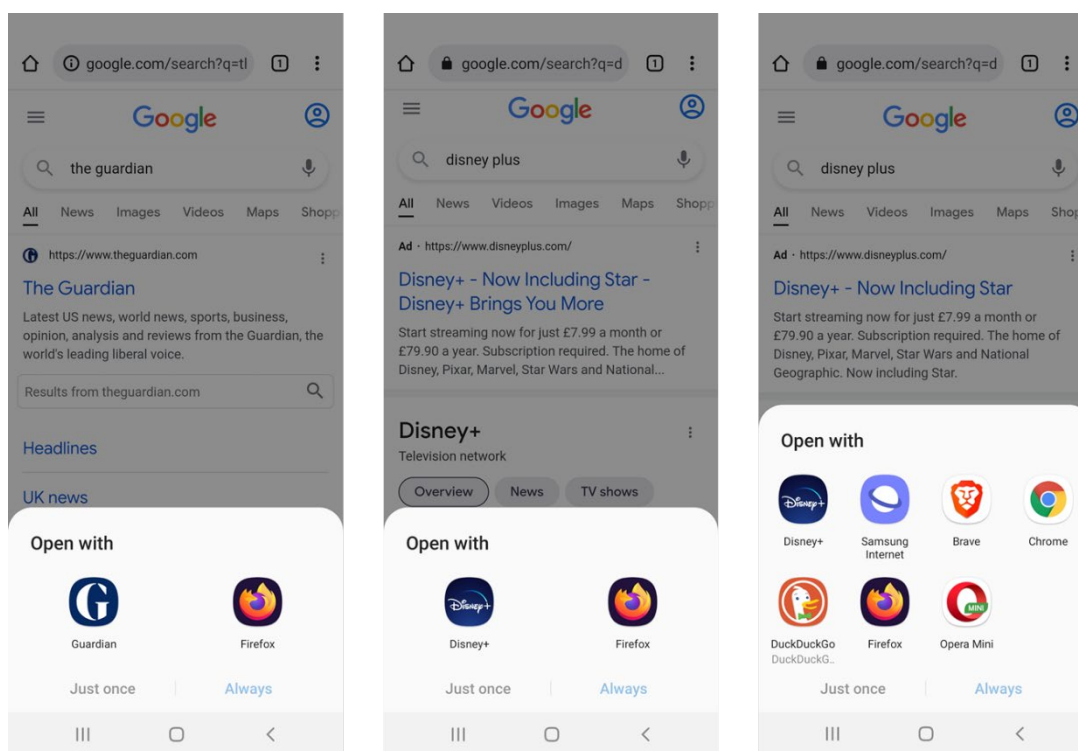
- *Design of the disambiguation box showing both browser and native (non-browser) apps*
73. Disambiguation boxes can also be displayed in other contexts. In particular, a disambiguation box showing both browser and native (non-browser) apps is displayed on devices running Android 11 or earlier versions when the user clicks on a deep link to a native app (unless the developer has verified the link as being associated with their app or the user has previously set that app as

⁴⁴ We discuss the disambiguation box for links to websites which can also be opened by a native non-browser app in the next section.

the default preference for this type of link). In such cases, the box will appear even if the user is attempting to access the link from an app capable of opening the link itself, for instance a browser app.⁴⁵ Figure G.11 provides a few examples of disambiguation boxes showing both browser and non-browser apps. Similar to the browser disambiguation box, the users can then either make a one-off choice by selecting 'Just once' or set the default for similar links by choosing 'Always'.

(ie if it has verified that its app is associated with the deep web link that the user is opening). In particular, it told us that, when a web link related to a native app is clicked on, it should open in the native app and a disambiguation box should not be shown, unless the developer has not verified that its app is associated with the link, the device is running Android 11 or earlier versions, and there is no prior system or user default for the intent being opened.

Figure G.11: Examples of disambiguation boxes showing both browser and non-browser apps



Note: Screenshots taken on Samsung Galaxy S20 running Android version 11 in November 2021.

⁴⁵ In addition, on all versions of Android (including Android 12), browsers can appear in disambiguation boxes alongside non-browser native apps whenever the app developer has registered that their app is capable of handling the same intent (eg opening a PDF).

- *Choice architecture considerations regarding disambiguation boxes*

75. While the disambiguation box provides users with an opportunity to change their default browser without accessing device settings, the choice architecture of the box could have the following implications for user behaviour:

- **Ordering of apps:** The disambiguation box generally presents a horizontal list of apps which can be split over multiple lines to incorporate all the browser and other relevant apps installed on the Android device. The order of presentation could impact users' behaviour by drawing their attention to the options presented first due to primacy effects.
- **Choice buttons:** Users are provided with two choice buttons at the bottom of the disambiguation box, 'Just once' followed by 'Always', placed side-by-side. We are concerned that users might be discouraged from choosing 'Always' if they are unaware or unsure of the process to reverse this decision in device settings. This risk would be magnified if native app disambiguation boxes are also being shown to them frequently.
- **Highlighted or pre-selected app:** As shown in Figure G.10, illustrating the different iterations of the disambiguation box, Chrome appears to be pre-selected or highlighted in certain scenarios. Pre-selecting or highlighting Chrome (or any other app) could enhance the likelihood of users selecting it, as it might appear to be the recommended choice and also because it looks like the more salient.

Android 12

76. Google removed the disambiguation box from showing when the user tries to open a web link in Android 12 (which was released in October 2021).⁴⁶ This is because installing a new browser does not remove the default browser setting on Android 12. Accordingly, if a user installs a new browser, links will still open in the user's default browser and the disambiguation box will not surface.⁴⁷ Table G.1 summarises the changes to the disambiguation box comparing Android 12 with previous releases.

77. [X]

⁴⁶ We note that the change only applies to devices where Android 12 is the operating system; on devices where Android 11 or earlier versions are the operating system, the disambiguation box still surfaces.

⁴⁷ However, the disambiguation box is still shown, and can include browsers, for other intents (eg opening a PDF).

78. We are concerned that removing the browser disambiguation box is not in line with Google’s design principles referenced above. Specifically, unless there is evidence from research or data to support the change, we believe it is proportionate to ask whether the user wishes to change their browser default. Displaying the disambiguation box while the user is trying to open a web link also appears to be within the context of the task the user is performing and thus, users are likely to be able to comprehend the choice.

Scenario	Android 11 or older	Android 12
User opens a URL for a website that is not associated with an app	Disambiguation box shows if the user has not set a default app for handling URLs	Link opens in user's default browser
User opens an unverified web link	Disambiguation box shows if the user has not set a default app for handling the deep link	Link opens in user's default browser - apps can request user's permission to open certain links in the future
User opens a verified web link (i.e. Android App Link)	Disambiguation screen does not show. User is automatically directed to the developer's app	No change

Source: Google

Prompts displayed by browser vendors and websites

79. There are prompts that can be displayed either by browsers or by browser vendors’ websites which ask users if they want to change their default browser. We welcome this as a useful feature but have concerns including that these are shown to a limited population of users (namely those that already have the respective browser installed on their device).

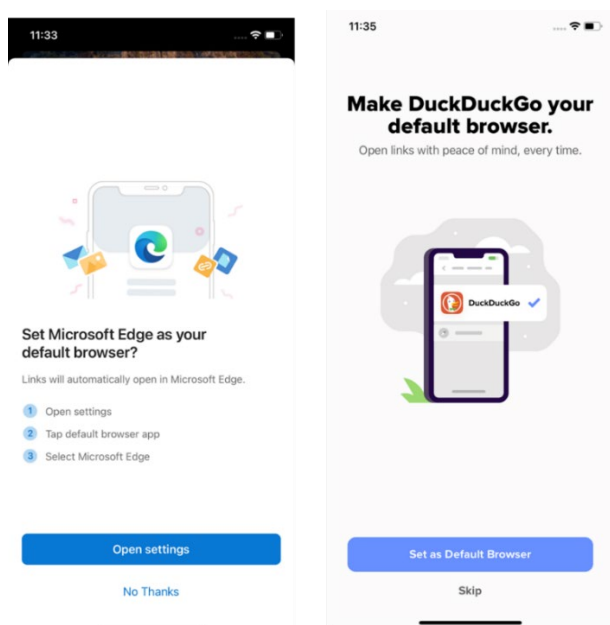
Prompts displayed by browsers

80. Both Apple and Google told us that third-party browsers can display shortcuts prompting users to switch their default browser. Figure G.12 and Figure G.13 show several examples of such prompts displayed by browsers on Apple and Android devices, respectively.
81. The prompts can differ in terms of when they are displayed. For example, we understand prompts are shown when the respective browser is in use, but some browsers appear to also be able to send notifications when their browser is not in use.
82. The prompts can also differ in terms of the information they display. For example, they may include information on how to change the default browser, they may outline the benefits of switching the default browser and, at least in

certain instances, they may display shortcuts for changing the default browser.

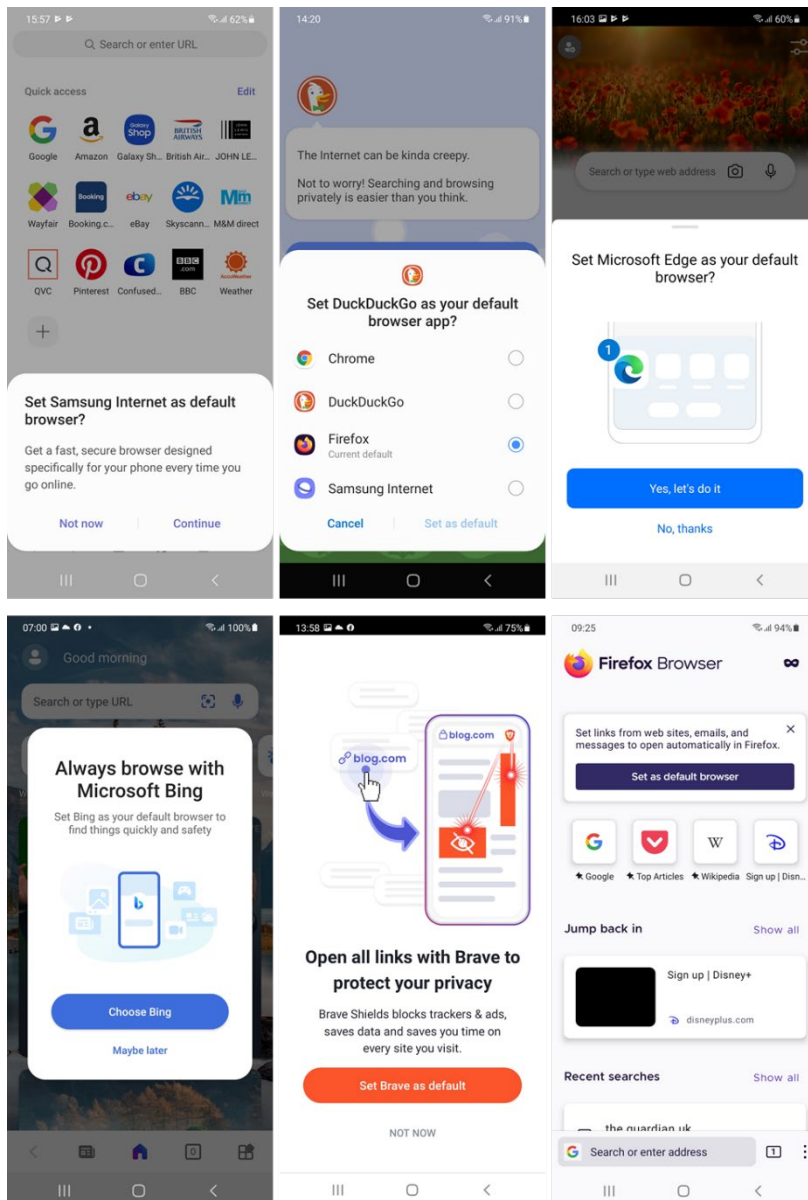
83. Some of the choice architecture features of prompts displayed by non-default browsers are outlined below:

- Some browsers, for instance Edge, include information on how to change the default browser within the prompt.
- Some prompts that ask users if they want to change their default browser highlight the choice button to change default settings, thereby making it more salient. For example, Edge highlights 'Open Settings' and DuckDuckGo highlights 'Set as Default Browser', as shown in Figure G.12.
- The prompts can also mention the benefits of switching default browser. For instance, as shown in Figure G.13, Samsung Internet includes the purpose string 'Get a fast, secure browser designed specifically for your phone every time you go online.'
- If the user chooses the option to change the default browser, the browser can display shortcuts for doing so, such as opening the settings to change the default browser, as shown in Figure G.14, for an iPhone. On Android, it appears to be possible for browsers to directly display the list of installed browsers and ask if the user wants to change their default browser to the one they are currently using (eg DuckDuckGo browser prompt, as shown in Figure G.13).



Note: Screenshots taken on iPhone XR running iOS 15.1 in November 2021.

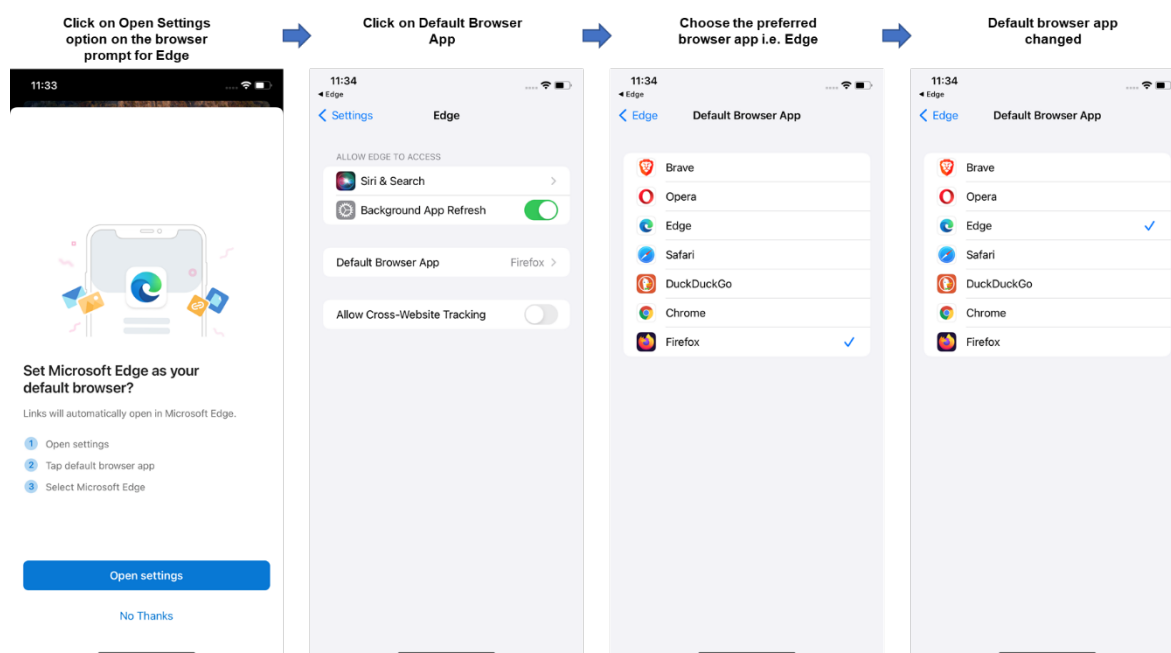
84. Google told us that it considers newly installed browsers displaying the list of all browser apps on the device and asking users if they want to change the default (eg DuckDuckGo) to be a relevant choice. This is because the user is already engaged in the context of installing the new browser and thus, browser vendors are able to show a prompt for users to change their default browser when they first launch the browser or subsequently.



Source: CMA

Note: Screenshots taken on Samsung Galaxy S20 running Android version 11 in November 2021.

Figure G.14: User journey for changing default browser using browser prompt on iPhone



Source: CMA

Note: Screenshots taken on iPhone XR running iOS 15.1 in November 2021.

85. Prompts displayed by browsers can be beneficial as they make it easier for users to switch their default browser, by raising awareness, by telling users how to switch and, in some cases by, making the switch easier. Making switching easier would decrease the importance of the initial default settings.
86. However, there are also a number of limitations with respect to the effectiveness of the prompts that can be displayed by browsers.
 - First, these prompts can only be effective for browsers that are already installed on a user's device. In many cases, this means that these prompts can only be effective for those users that went through the process of installing an additional browser.
 - Second, we understand that browser vendors may not have visibility over whether their browser is already the default or not and are hence not able to target their prompts only at users for which the browser is not set as the default. Both Mozilla and Yandex for example told us that on iOS, browser vendors do not have visibility on whether their browser is set as the default because Apple does not provide any APIs or analytics.
 - Third, the choice architecture may be suboptimal. For example:
 - launching a shortcut for changing the default setting is a more powerful tool than displaying information on how to change the default and the benefits of it, but it is unclear to what extent browser vendors

have access to the respective API that lets them launch such a shortcut; and

- users that do not actually want to change their default are (potentially repeatedly) shown these prompts. This could increase the burden on them, reduce their engagement with the prompts and result in the degradation of their browsing experience.

Prompts displayed by websites

87. Several respondents raised concerns with respect to Google websites prompting users to download Chrome and/or change their default to Chrome.
- One of the Statement of Scope responses noted that Google advertises Chrome to users that visit Google’s homepage and encourages them to switch.⁴⁸ According to a linked blogpost, the notification appears every single time the user visits Google’s home page in a browser that is not Chrome.⁴⁹
 - Microsoft submitted that YouTube, Google.com and other Google web properties prompt users to switch to Chrome.
88. Similar to prompts displayed by browsers, these prompts can, in principle, facilitate switching. However, given that Google has a much wider web presence than other browser vendors (most notably through its position in Google Search), these prompts primarily benefit Google. As such, these prompts do not reduce barriers for smaller browser vendors, but instead raise them – as even those users that decided to switch to an alternative browser are prompted to switch back to Chrome.
89. In addition, Google’s prompts could increase the burden on users and possibly reduce their engagement with the prompts. We also note that there is a question as to whether continual prompts across the Google eco-system fit with Google’s stated design principles described above, including proportionality.

⁴⁸ Statement of Scope response from Dr Greig Paul and Dr James Irvine.

⁴⁹ [How to block the "Switch to Chrome" notification on Google.com : Adblock Help \(getadblock.com\)](https://adblockhelp.com/how-to-block-the-switch-to-chrome-notification-on-google-com).